

Having described the invention, what is claimed is:

1 1. A thrust bearing assembly comprising:

2 two thrust races;

3 a plurality of rolling elements between and against the  
4 two thrust races, for supporting relative rotation of the  
5 thrust races about a common axis;

6 a spring washer axially outward of the two thrust races  
7 for engaging a support surface and for applying a preload to a  
8 first of the two thrust races; and

9 retention means for retaining the two thrust races, the  
10 rolling elements and the spring washer together as an assembly  
11 to facilitate handling and installation.

1 2. A thrust bearing assembly according to claim 1, wherein

2 the retention means comprises an axially extending case

3 positioned radially inward or radially outward of the two

4 thrust races, the rolling elements and the spring washer, to

5 restrain radial movement thereof; and wherein the case has

6 radially extending portions engageable with the spring washer

7 and a second of the two thrust races to restrain axially

8 outward movement of the spring washer and the second thrust

9 race.

1 3. A thrust bearing assembly according to claim 2, wherein  
2 the case comprises a drawn cup with a lip extending radially  
3 and engageable with the spring washer to restrain axially  
4 outward movement of the spring washer.

1 4. A thrust bearing assembly according to claim 3, wherein  
2 the case includes a second lip extending radially and  
3 engageable with the second thrust race.

1 5. A thrust bearing assembly according to claim 4, wherein  
2 the case is formed of two drawn cups that overlap, forming a  
3 cylindrical double-wall portion.

1 6. A thrust bearing assembly according to claim 4, wherein  
2 the case is formed of a single drawn cup.

1 7. A thrust bearing assembly according to claim 4, wherein  
2 the case comprises a drawn cup with an apertured bottom  
3 portion extending radially and engageable with the spring  
4 washer to restrain axially outward movement of the spring  
5 washer.

1 8. A thrust bearing assembly according to claim 1, wherein  
2 the spring washer comprises a Belleville spring having a

3 conical cup facing axially outward from the thrust races.

1 9. A thrust bearing assembly according to claim 1, wherein  
2 the spring washer comprises a Belleville spring having a  
3 conical cup facing axially inward toward the thrust races.

1 10. A thrust bearing assembly according to claim 1, wherein a  
2 first of the thrust races has an outer diameter smaller than  
3 the outer diameter of a second of the thrust races, to  
4 facilitate flow of lubricant, and wherein the first thrust  
5 race has an inner diameter smaller than the inner diameter of  
6 the second thrust race, to facilitate flow of lubricant.

1 11. A thrust bearing assembly according to claim 1, wherein  
2 the rolling elements are rollers retained within a bearing  
3 cage.

1 12. A thrust bearing assembly according to claim 11, wherein  
2 the bearing cage is of a box-type configuration.

1 13. A thrust bearing assembly according to claim 11, wherein  
2 the bearing cage is of a sigma-type configuration.

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1 14. A thrust bearing assembly according to claim 2, wherein  
2 at least some of the radially extending portions engageable  
3 with the spring washer or thrust race are formed by staking.

1 15. A thrust bearing assembly according to claim 1, wherein  
2 the two thrust races, the rolling elements and the spring  
3 washer are configured to have zero axial clearance within the  
4 retention means, prior to installation of the thrust bearing  
5 assembly, such that damage from vibration during handling is  
6 reduced.